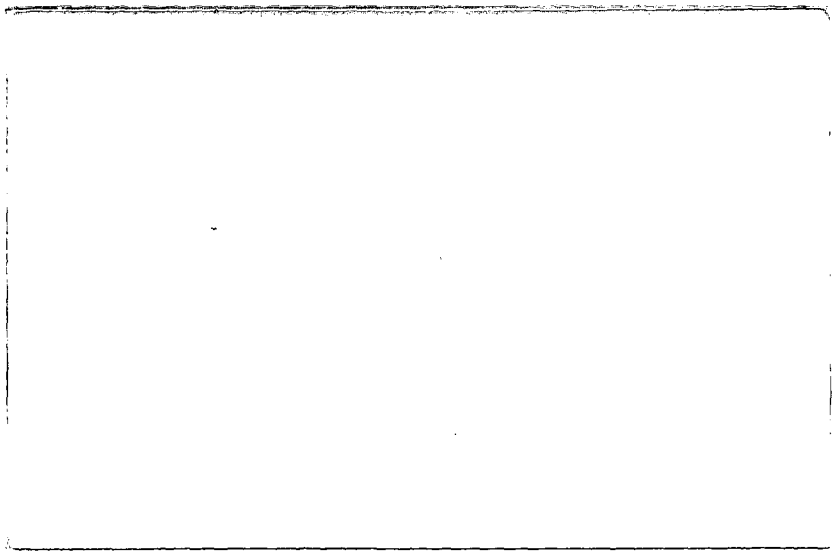

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ECONOMIC IMPLICATIONS OF ENVIRONMENTAL LEGISLATION FOR WETLANDS

by

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and
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ALTERNATIVE MANAGEMENT STRATEGIES
FOR
VIRGINIA'S COASTAL WETLANDS
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FOREWARD

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ABSTRACT

Although recent changes in public attitude towards wetlands has resulted in considerable Federal and State environmental legislation directed at wetlands, little attention has been given to analyzing the economic implications of such environmental legislation.

In this report, three types of environmental legislation are used for illustrative purposes. The three primary examples considered are: 1) the U.S. Army Corps of Engineers controls over work in navigable waters, 2) the Virginia and Maryland Wetlands Programs, and 3) various legislation for creating sanctuaries. The intent of each of these pieces of legislation is to reduce the number of wetlands conversions over what might have been without such legislation. The economic implications of such legislations are difficult to quantify. Some development services of altered wetlands are sacrificed to obtain preservation services of unaltered wetlands. Preservation benefits attributable to wetlands include production of fish, wildlife and flora, protection against shore erosion, absorption of silt and pollutants that enhance the recreational and aesthetic enjoyment. The social costs of obtaining these benefits for the public domain are those of the costs of devising, implementing, and policing the land use controls; the loss to society of the development foregone; and the loss associated with reduction of individual choice concerning land use decisions. The balancing of the benefits gained versus the benefits lost is the key issue in managing wetlands.

Environmental Legislation for Wetlands: An Examination of Federal and State Policy and Economic Impacts*

Sandra S. Batie and William E. Cox**

The public attitude toward wetlands, marshes, swamps, and bogs has undergone considerable change in the last decade. Whereas the stated policy was once one of filling these damp acres for "public welfare and public health," there now is a voiced public concern for preservation of such acres in a natural, unaltered state.

In the Virginia Commonwealth, for example, a policy statement enacted in 1910 expresses the earlier attitudes toward drainage:

> It is hereby declared that the drainage of the surface water from wet agricultural lands is essential for the successful cultivation of such lands and the prosperity of the community, and the reclamation of overflowed swamps and tidal marshes shall be considered a public benefit and conducive to the public health, convenience, utility, and welfare.[1]

Note that in 1972 on the basis of the same public welfare rationale, the following policy statement was adopted by the state legislature:

> Therefore, in order to protect the public interest, promote the public health, safety and the economic and general welfare of the Commonwealth, and to protect public and private property, wildlife, marine fisheries and the natural environment, it is declared to be the public policy of this Commonwealth to preserve the wetlands and to accommodate necessary economic development in a manner consistent with wetlands preservation.[2]

Interestingly, the 1910 provision declaring the reclamation of tidal marshes to be a benefit remains in effect.

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*Paper presented at "Citizens Program for Chesapeake Bay, Inc." Conference-Workshop on "Impact of Recent Environmental Legislation on Chesapeake Bay and Implications for Citizen Action," October 21, 1976, Hunt Valley, Maryland.

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At the Federal level, the positioning of the words in the Coastal Zone Management Act of 1972 declaration of policy is indicative of this emerging new attitude:

> The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore, or enhance the resources of the Nation's coastal zone.... (emphasis added)[3]

The reason for this change in attitude is probably a combination of improved knowledge of the ecological significance of wetlands, changing evaluations of the benefits of preserving ecological services, and an increased visibility and political effectiveness of those individuals and groups who value preservation of wetlands. The present result of this altered public view is legislation which appears to give greater weight to preservation values than to development values, and to provide more preservation of wetlands in their natural state than an unfettered market would normally provide. As with most resources, wetlands can be utilized to fulfill a variety of competing and complimentary services. As a society, we value all these services. Unfortunately, we cannot simultaneously maximize all these services; some must be sacrificed to obtain others.

One cannot simultaneously dredge a boat basin and at the same time capture the services of the unaltered acreage as a natural blue crab nursery. Bulkheading and filling for aesthetics, safety and boat access is frequently at the expense of services such as wildfowl nesting. Choices, difficult choices, must be made: for it is usually not a question of preventing a "bad or evil" happening, as much as it is a question of choosing between various levels of competing and desired services. Needless to say, different individuals will value these competing services differently, and these values are dynamic - they are subject to change with changing circumstances.

The purpose of this paper will be to examine how these changing attitudes have been reflected in environmental legislation, specifically the legislation influencing tidal wetlands. The implementation of this legislation has gained some benefits, those benefits associated with preservation, only by "trading in" benefits associated with altering wetlands. The scope and implications of this type of tradeoff will be discussed with specific attention to Virginia's and Maryland's wetlands acres.

Environmental Legislation

The emerging orientation toward preservation of natural wetland environments can be illustrated by a variety of recent legislative enactments. The three primary examples to be considered here include (1) the U.S. Army Corps of Engineers controls over work in navigable waters, (2) the Virginia and Maryland wetlands programs, and (3) various legislation for creating sanctuaries.

U.S. Army Corps of Engineers Program

The Corps of Engineers authority with respect to wetlands and activities conducted in tidal waters is the result of a long evolutionary process. The River and Harbor Act of 1899, from which the Corps get much of its mandate in

this area, has protection of navigation as a major objective. And, correspondingly, this objective traditionally has been the main emphasis of the Corps regulatory program. This narrow focus resulted in no significant attention being given to wetlands during the early phases of the regulatory program. In fact, construction shoreward of established harbor lines was given blanket authorization and did not require individual permits prior to 1970.

In recognition of the increasing public concern to subject such projects to an evaluation in terms of their environmental effects and other impacts on the "public" interest, the Corps procedure was modified in 1970 to require permits for formerly exempted projects.[4] The modification extended the permit program to all projects within Corps jurisdiction, traditionally extending only to the high water mark. This expansion specifically included certain marshlands and shallow areas obstructed by vegetation, but only to the extent that they were subject to innundation at normal high tide. Thus, federal jurisdiction still did not encompass those wetland areas located above the high water mark.

It was not until passage of the Federal Water Pollution Control Act Amendments of 1972[5] (FWPCA) that there was an expansion of federal jurisdiction to encompass areas above the high water mark. Section 404 of these Amendments[6] gave the Corps of Engineers the responsibility of issuing permits for proposed disposals of dredged or filled material into "navigable waters." The mechanism for expansion of traditional jurisdiction consists of the definition of the term "navigable waters." FWPCA defines the term simply as "... the waters of the United States, including the territorial seas."[7] This definition contains no qualifications with regard to actual physical suitability for navigation, nor have the courts provided any substantial constraints limiting the definition. In fact, the courts have accepted the broadest interpretation of the term. A 1975 U.S. District Court case (Natural Resource Defense Fund, Inc. vs. Callaway)[8] declared the definition of "navigable waters" in existing Corps regulations to be inconsistent with the provisions of FWPCA and therefore invalid. The court ordered the Secretary of the Army and the Chief of the Army Corps of Engineers to develop new regulations that would extend Corps permit jurisdiction to navigable waters as defined in FWPCA.

The modified regulations as published in the Federal Register on July 25, 1975[9] extend Corps permit jurisdiction under section 404 of FWPCA specifically to:

> All coastal wetlands, mudflats, swamps, and similar areas that are contiguous or adjacent to other navigable waters. "Coastal wetlands" includes marshes and shallows and means those areas periodically inundated by saline or brackish waters and that are normally characterized by the prevalence of salt or brackish water vegetation capable of growth and reproduction.[10]

Present Corps policy for evaluating permit applications with regard to their impact on wetlands states that unnecessary alteration or destruction of wetlands should be discouraged as contrary to the public interest. Thus, the Corps will not grant permits for projects in wetlands in their jurisdiction unless an analysis indicates "...that the benefits of the proposed alteration

outweigh the damage to the wetlands resource and the proposed alteration is necessary to realize those benefits."[11] Guidelines for this analysis provide the following criteria for evaluation of each permit application.

> (i) The relative extent of the public and private need for the proposed structure or work.
>
> (ii) The desirability of using appropriate alternative locations and methods to accomplish the objective of the proposed structure or work.
>
> (iii) The extent and permanence of the beneficial and/or detrimental effects that the proposed structure or work may have on the public and private uses to which the area is suited.
>
> (iv) The probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated structures or work in the general area.[12]

Final disposition by the Corps of a permit application is influenced to a considerable degree by input from outside the agency. For instance, Corps policy provides that permits will not be issued where any authorization or certification required by federal, state, or local law has been denied. Furthermore, permits will generally be issued where a state approves a project, unless overriding national factors of the public interest are revealed during processing of the permit application.[13] On the basis of a memorandum of understanding between the Secretary of the Army and the Secretary of Interior,[14] district Corps offices are prohibited from approving projects over the objections of the regional directors of the Fish and Wildlife Service. Where disagreements exist, the case must be forwarded to the Corps headquarters office in Washington for final resolution. Pursuant to the provisions of section 404 of FWPCA, Corps permit decisions under this section are also subject to override by EPA.

There is evidence that the Corps will deny permits for wetland alterations that in their opinion do not have benefits to outweigh damages. In April, 1976, the U.S. Army Corps of Engineers denied dredge and fill permits requested by the Deltona Corporation for a huge Marco Island project in southwest Florida. This dredge and fill project involved 18.2 million cubic yards, the largest housing project to ever come before the Corps of Engineers. The denial was exceptional in another way in that the Marco project was half completed, having started nearly 12 years ago. If the court appeal fails, Deltona will be forced to either convince purchasers of lots to accept a redesign or to repurchase the lots from investors. Since over 90% of the more than 10,000 plotted lots are sold, this is a multimillion dollar endeavor.[15]

Although such examples can be identified, it is difficult to project the long-range impact of the Corps program. The role of the Corps as protector of the unaltered natural environment is a new function without historical precedent from which future performance can be projected. Another reason for uncertainty arises from the possibility that Corps jurisdiction in this area will be restricted. Proposals currently being considered by the Congress contained in FWPCA were considered by the 94th Congress, but differences between the House and Senate bills were not resolved prior to adjournment. Thus, it is too early to predict whether the orientation towards protection of the natural environments will remain a goal of Corp's permit policy.

State Wetlands Programs: Virginia

In Virginia alteration of wetlands which are (1) bounded by low water and an elevation above low water by a vertical distance equal to 1.5 times the mean tide range at the site in question and (2) has certain types of vegetation present is subject to the Virginia Wetlands Act.[16] Attempts to modify wetlands require a permit approved by a local wetlands board or by the Virginia Marine Resources Commission (VMRC).

The Virginia Wetlands program is based on the premise that wetlands constitute an irreplaceable natural resource essential to existing ecological systems, and this premise is reflected in the standards of the use and development of wetlands:

(1) Wetlands of primary ecological significance shall not be altered so that the ecological systems in the wetlands are unreasonably disturbed;

(2) Development in Tidewater Virginia, to the maximum extent possible, shall be concentrated in wetlands of lesser ecological significance, in wetlands which have been irreversibly disturbed before July one, nineteen hundred seventy-two, and in areas of Tidewater Virginia apart from the wetlands.[17]

The controls over wetlands alteration contained in the Virginia legislation are designed for location implementation. The mechanism for wetlands protection exists in the form of a zoning ordinance[18] which may be adopted by counties, cities, or towns. This ordinance provides that non-exempted use or development of wetlands requires approval in the form of a permit to be granted by an appointed wetlands board created by the governing body of any political subdivision enacting the ordinance.

There are activities exempted from the need for permits such as structures constructed on pilings that preserve the natural contour of the marsh and do not obstruct tidal flow, aids to navigation, or any government activity on wetlands owned or leased by the Commonwealth of Virginia or a political subdivision thereof. Furthermore, any project commenced prior to July 1, 1972 is not affected by the Act although any expansion or enlargement of such a project after that date would be subject to control. Projects are also exempted where plans have been filed prior to this date with appropriate agencies of the federal or state government or with either the planning commission, board of supervisors, or city council having jurisdiction over the project.[19]

Application for non-exempted alterations of wetlands is presented to the local wetlands board, and the board is required to hold a public hearing and prepare a written record. The board must base its decision on testimony concerning the project and the impact of the development on the public health and welfare as expressed by the policy of preserving wetlands. The board grants the permit if it finds "...that the anticipated public and private benefit of the proposed activity exceeds the anticipated public and private detriment and that the proposed activity would not violate or tend to violate the purposes and intent of wetlands legislation..."[20] Permit decisions by local boards are subject to review and possible reversal by VMRC. Where the local wetlands

ordinance is not adopted, VMRC is authorized to administer a permit program for that locality.[21]

There appears to be reasonable evidence that the intent of the Wetlands Act in Virginia is preservation of wetlands in unaltered states and that wetlands should not be converted to development that is not clearly water dependent. Implementation of such legislation appears reasonably consistent with this intent. Local wetlands boards have refused permits for a large subdivision in Matthews County, a large supermarket in Virginia Beach, and a recent study[22] suggests that more projects of large scale are refused as compared to those of smaller acreage. The results of a survey conducted for this study were that all Virginia wetlands boards claimed to weigh environmental regulations extremely heavily in their decision process. Also, although boards recognized other non-environmental factors in considering decisions, they stated extreme reluctance to make a ruling in contradiction to environmental recommendations.

State Wetlands Programs: Maryland

The Maryland wetlands program is based on a policy to preserve the wetlands and prevent their despoliation and destruction, taking into account varying ecological, economic, developmental, recreational, and esthetic values.[23]

The Maryland program exhibits a number of marked contrasts when compared with the Virginia program. One of the most fundamental differences is the fact that the local level of government is not directly involved in administration of wetlands controls. Basic responsibilities for administration are vested in the State Secretary of Natural Resources and the Board of Public Works.

The Maryland controls distinguish between state owned and private wetlands, with separate provisions applicable to each category. In the case of state owned wetlands, a license from the Board of Public Works is required before dredge or fill operations can be conducted.[24] The Board has a legislative mandate to issue a license to dredge or fill state wetlands if issuance is in the best interest of the state in view of the ecological, economic, developmental, and esthetic values of each individual situation.

Private wetlands as delineated by the Secretary of Natural Resources are subject to regulations governing dredging, filling, and other alteration.[25] Certain activities are allowed by statute without regard to these regulations, including the following:

(1) Conservation of soil, vegetation, water, fish, shellfish, and wildlife;

(2) Trapping, hunting, fishing, and catching shellfish if otherwise legally permitted; and [sic]

(3) Exercise of riparian rights to improve land bounding on navigable water or protect the shore against erosion; and

(4) Reclamation of fast land owned by a natural person and lost during his ownership of the land by erosion or avulsion to the extent of probably preexisting boundaries. The right to reclaim lost fast land relates only to fast land lost after January 1, 1972. The burden of proof that the loss occurred after this date is on the owner of the land.[26]

The regulations of the Department of Natural Resources are somewhat explicit regarding authorized uses of private wetlands. Examples of specific activities allowed include construction or maintenance of agricultural drainage ditches as approved by a soil conservation district, mosquito control projects approved by the state entomologist, cultivation and harvesting of agricultural or horticultural products, construction of structures on open pilings, excavation of boat channels below specified dimensions and construction and maintenance of tide gates to prevent salt water encroachment into agricultural drainage ditches.

Another category of use that simply requires notice to the Secretary of Natural Resources includes wetlands alterations customarily associated with conservation of soil, vegetation, water, fish, shellfish, and wildlife; improvements to preserve access to navigable waters or to protect private wetlands against erosion; and the installation and maintenance of underground utilities, provided the surface of the wetlands is restored substantially to its original condition.

The regulations require permits for certain other alterations of private wetlands not included in the exemptions, including filling with soil or other material, dredging, draining, or removal of soil or similar material; and any act that would destroy the natural vegetation, substantially alter existing patterns of tidal flow, or otherwise alter the beneficial character of the wetland.

Legislation for Creating Sanctuaries

In addition to the federal, state, and local programs for regulating the use and development of wetlands, a number of mechanisms have been developed for creating special sanctuaries that can result in wetlands preservation. There are a number of legislative provisions that authorize acquisition of land areas potentially encompassing wetlands,[27] but of special interest are the National Estuary Protection Act,[28] the Coastal Zone Management Act,[29] and the Marine Protection Research and Sanctuaries Act of 1972.[30]

The National Estuary Protection Act provides for the Secretary of Interior to conduct a study of estuary areas with regard to their value both in the natural state and for development for urban, commercial, and industrial uses. One purpose of the study is the determination of the need for acquiring land or water areas for administration by a governmental entity. This program has never received significant funding but is a potential mechanism for estuary preservation.

The Coastal Zone Management Act of 1972 (CZMA) also contains a provision for creation of estuarine sanctuaries.[31] However, this provision is not intended to provide a general means of preserving wetlands but is limited to the

purpose of creating natural field laboratories for study of coastal zone processes.

In addition to this sanctuary provision, CZMA also contains other mechanisms for preservation of certain areas. The Act requires state CZM programs to make provisions for procedures "...whereby specific areas may be designated for the purpose of preserving or restoring them for their conservation, recreational, ecological, or esthetic values."[32] When considered with other provisions of the Act and NOAA regulations promulgated pursuant thereto, it is obvious that inclusion of wetlands is contemplated. For example, regulatory amplification of CZMA provisions[33] for designation of areas of particular concern within the coastal zone identify several types of areas that may encompass wetlands, including "areas of high natural productivity or essential habitat for living resources, including fish, wildlife, and the various trophic levels in the food web critical to their well-being."[34]

The Marine Protection Research and Sanctuaries Act of 1972 provides for the Secretary of Commerce, with the approval of the President and subject to the veto of an affected state, to designate areas of the ocean as marine sanctuaries.[35] Such sanctuaries are to be located between the high tide line and the outer edge of the continental shelf. The scope of the marine sanctuaries program is relatively broad and includes preservation for the purposes of protecting habitats representative of important marine systems; maintenance of particular species by protection of such areas as migratory pathways, spawning grounds, and nursery grounds; establishing research areas to establish ecological baselines against which to compare and predict the effect of man's activities; augmenting public lands for recreation and esthetic enjoyment; and protecting unique geological oceanographic, or living resource feature.[36]

Economic Implications

Determination of the economic implications of environmental legislation involves a number of obstacles. First, there is the question of how such legislation will be interpreted and implemented. The balancing process involved in making regulatory decisions remains somewhat subjective, with the result that implementation of legislation will reflect the values and perspective of the decision-making body. Thus, the location of administrative responsibilities with regard to level of government may be a significant determinant of implementation direction, although at present federal, state and local administrators all appear to have accepted a preservationist philosophy. This dependence on present personal values also indicates that implementation philosophy may change over time as the composition of administrative bodies change.

Regardless of these obstacles, however, some implications of this legislation can be identified. The direction of the legislation is clearly for more preservation than the existing land market would provide. To this point, the administration and implementation of such legislation appears to be in sympathy with this intent. Using these as premises, some analysis of probable economic implications can be made.

Obviously some development services of altered wetlands are being sacrificed to obtain preservation services of unaltered wetlands. Preservation

benefits attributable to wetlands include production of fish, wildlife, and flora; protection against flooding and shore erosion, absorption of silt and pollutants; and enhancement of recreational and aesthetic enjoyment. The social costs of obtaining these benefits for the public domain are threefold. One is simply the costs of devising, implementing, and policing the land use controls. The second is the loss to society of the development foregone. The third is the utility loss associated with the reduction of individual choice concerning land use decisions. Not all of these detriments can be objectively quantified, but certain implications can be identified such as impacts on prices, ownership, employment, and regional economy, as well as changes in the incidence of gains and losses.

Development Foregone

Although there are few substitutes for the biological services performed by wetlands, many developments which are located presently on filled wetlands could easily be located elsewhere. However, in most cases, there is some economic reason why the wetland area was favored. If firms and residents presently on wetlands were forced to move to an inland site, there would be presumably some loss incurred by being forced to select a second choice site. For example, residents located on wetlands are receiving the amenity services of a wetland -- scenic water and perhaps boat access to such water. In Virginia Beach, a recent study has suggested that the people are willing to pay at least $4500 for an acre of filled wetlands above what they would pay for a similar inland parcel.[37] Furthermore, the trend seems to be that this waterfront premium has increased over time, suggesting that the demand for such waterfront acreage has been increasing.

If future residential development of a nature to capture water amenities of wetlands is severely restricted due to environmental legislation, there are several probable impacts. First, one would expect to see existing waterfront homes gain in selling price simply because the supply of such homes is being held constant, while demand for these homes is increasing. If total foreclosure of wetland development were certain, then owners of existing unaltered wetlands face a substantial loss. Depending on the circumstances, they might not only lose the additional "price premium" from having a waterfront home, they may lose the entire value of the acreage as a home site should development be forbidden.

An example of potential losses associated with relocation of commercial activities is given by a Virginia Beach case involving a supermarket. A regional supermarket chain was originally denied permission to construct a store and parking lot on 3.5 acres of marsh near the resort strip in Virginia Beach. Although the permit was eventually approved, the case can be used as an illustration of the type of analysis appropriate to development foregone.[38] Reportedly, the supermarket firm paid $185,000 for the property, or over $50,000 per acre, a sum no doubt reflecting the expected return from converting the marsh. This particular site was desirable to the firm because of its location in one of the most densely developed sections of Virginia Beach. The reason for the original permit denial was based on the possible undesirable effects of the loss of drainage and flood absorption capabilities of the marsh. There is, of course, value associated with preserving these services and protecting neighboring fastland properties, but there are also values foregone by

denying the supermarket permission to build. If the original permit denial had been upheld, the chain would have absorbed a $185,000 loss when its property was, in effect, declared commercially worthless.[39]

Even if the supermarket had located elsewhere in Virginia Beach, there would be losses from the differences in sales resulting from the selection of an inferior location in terms of saving the existing customers relative to the preferred site. The average new community supermarket in 1975 averaged $85,000 in weekly sales or over $4.4 million sales a year.[40] For the sake of illustration, assume the second best alternative location meant the loss of 10% of these sales, a decline of $440,000. Assuming a net profit on sales before taxes of 1.5%,[41] the supermarket loses another $6,600 every year that it could have captured at the better marshland location. The present value of such a foregone stream of income (at 8% interest) over a 20 year life span is equal to $64,800. The supermarket would therefore only purchase a second choice site if the land price were less than $120,200 ($180,000-$64,800). If the supermarket were not constructed at all, the regional economy would suffer from the loss of construction dollars and employment that would have been incurred. If, for example, construction costs were $465,000 (the average capital investment average for new 1975 stores minus the cost of land),[42] regional economy losses of foregone increased household income for the year would be nearly $292,600; employment in the region would be less by 52 employees when all effects, indirect and direct, are accounted for.[43]

This is because any time a sector of any economy grows or contracts, the effects of the change reverberate through other sectors of the economy. For instance, a contraction in the construction industry will be felt in the manufacturing sector as fewer materials are needed. This change in purchases will in turn be felt in another sector of the economy. It is the sum total of the direct and indirect effects of foreclosing an action that measures the impact of development foregone.

Impacts such as these are larger if there are no existing firms in the region to assume the lost sales of the foreclosed firm. For the sake of illustration, assume a seafood processing firm is denied permission to develop on a wetland and elects to leave the region. Again for the sake of illustration, let us suggest this firm would have employed 85 individuals directly and had annual sales of $3.25 million. In this case, there would not only be the loss to the regional economy of foregone construction activity, but also direct household income losses of $928,000 per annum and loss of direct sales from local sectors to the seafood processing firm of about $1.66 million. There would also be the indirect effects of income and employment as well. In this case, total business activity foregone would be more than $6.5 million, household income foregone would total $1 million per year and ultimate employment foregone would be approximately 200 employees.[44] Actual benefits foregone would need to be adjusted downward by the public costs that would have been incurred in servicing the industry and employees.

This type of analysis applies whenever development is actually foregone by a decision, and not replaced by increased development elsewhere. There are some additional concerns even if the demand for a type of development service is fulfilled in another location or manner. Let us again illustrate by way of example. Although the Virginia evidence is scanty, there is a possibility that small project permit application have a higher probability of

approval than large project proposals.[45] Let us speculate, therefore, that marina proposals are less apt to be approved than individual owner projects. Some probable effects are higher prices and more congestion at existing marinas. More specifically in terms of wetlands preservation is that there probably would be an increase in private boat facility applications relative to the number that would have occurred if a new marina were allowed. Numbers of wetland acres converted may actually be more than had the marina been permitted. This is a lesson economics teaches us: everything depends on everything else. Inhibit an action in one part of the market and the effects may be felt in another, perhaps unanticipated, sector or part of the market.

There are obviously changes in the market value of wetlands that accompany legislation to restrict conversion. If such restriction is known to operate with certainty, then the market value of undeveloped wetlands will decline and their owners will face a substantial loss.

If total foreclosure of wetland development is uncertain, however, some undeveloped wetland acres may experience a rise in price. Since the total amount of developable wetlands acres will decrease, the "premium" to be gained if one can actually obtain a permit and develop a waterfront lot increases. If permit denial for some acres is subject to uncertainty, these acres may actually be bid up in price by those willing to pay the price for a possible "bonanza" should permit approval be obtained.

In Virginia, guidelines have been developed by the VMRC[46] on the basis of studies conducted by the Virginia Institute of Marine Science to assist localities in regulation of wetlands use. These guidelines classify wetlands by type and set forth the environmental consequences of their alteration. Factors used in the evaluation process consisted of vegetation production and detritus availability, waterfowl and wildlife utilization, erosion buffering, water quality control, and flood buffering. Twelve types of wetlands are evaluated in accordance with these factors and grouped into five classifications based on total environmental value. "Class I" wetlands are the "best" wetlands based on environmental criteria. If these guidelines are adhered to with certainty so that higher biologically productive acres are always preserved, then it will be the market value of these acres that will decline while the market value of lower biologically valued acres will increase. If those areas where Class I wetland acreage is located in the best development areas, this type of preservation may raise development costs by forcing development to occur on less desirable sites.

The occurrence of these types of impacts, therefore, depends not only on the gains from converting a particular wetlands tract but also on the certainty that such a conversion will be allowed. The wetlands legislation will influence the gains to be made and also will increase the level of uncertainty associated with the capture of such gains.

Herein lies the irony of many land use controls. Although such mechanisms are intended to bring order to an imperfect system, they may actually do the opposite. This is because zoning, permit approval uncertainty, and other planning techniques increase the risk of holding and developing property by making the form and the date of land use conversion less predictable. Increasing risks will eventually be reflected in increased prices of developed properties.

Social Benefits of Preservation

Against these costs of preservation must be weighed the benefits of preservation. The benefits are difficult to quantify partly because so little is known concerning the biological and physical linkages pertaining to marshland. For example, it is known that wetlands provide habitat and nursery grounds for fish - but the relationship between one less acre of wetlands and the biomass of any fishery is not yet part of our knowledge. Wetlands do contribute to fisheries and wildlife propagation: they serve as a flood protection and erosion control; they provide a natural assimilation of some waste products; they are aesthetic to some people and provide recreation activities for others. All these activities are valuable, even if the marketplace does not normally trade in these services. It is not true that we cannot quantify these values, but it is difficult. First, there is reasonable evidence that the demand for preservation services of wetlands is increasing. That is particularly evident as rising incomes cause individuals to place a higher value on another day of recreation than they have previously. Rising incomes also seem to be well related to the demand for "aesthetics"; the desire to forego development and maintain an unaltered environment. In some areas individuals or groups of individuals have revealed their willingness to pay for such preservation by purchasing areas of concern or supporting bond issues for publicly financed purchases.

In some cases, values can be estimated by viewing alternative methods of obtaining similar services (e.g., waste assimilation) for which there is a demand. Another technique is to relate changes of wetland productivity to changes in the net value of related production such as fishery products. It would not be appropriate, however, to impute the total value of the commercial fisheries to wetlands; to do so would be to imply that (1) all fishes depend on wetlands, and (2) that the choice is between preservation and conversion of 100% of the wetlands.

Just as when calculating development values, the important question is the benefits and costs of preserving an additional acre of wetland, not the benefits and costs of preserving 100% of the wetlands. That is, the more acres preserved, the less socially valuable will be an additional acre preserved. Corresponding, the more waterfront development allowed, the less socially valuable will be another altered wetland acre. Or put another way, just because one wetland acre is best preserved (developed) this does not suggest that all wetland acres should be preserved (developed).

The Wetlands Act recognizes this: 100% preservation is not the objective of the law. Specifically, Virginia's Wetlands Act states that "the public policy of this Commonwealth [will be] to preserve wetlands and to prevent their despoliation and destruction and to accommodate necessary economic development in a manner consistent with wetlands preservation [emphasis added]."[47] The economic implications then revolve around how many acres are preserved, the manner of the preservation, and the location of these acres.

There is the problem, then, of preserving wetlands solely on the basis of highest biological productivity. The Virginia guidelines suggest this as

a criteria, but this approach ignores the fact that these Class I wetlands may also have the highest returns to development as well, and thus may have a higher social value in development. Conversely a low biologically productive acre may in some locations, be best preserved as undisturbed wetlands because of even lower valued returns to development. Thus, preserving wetlands with highest biological productivity is not necessarily synoymous with weighing benefits and detriments.

Indeed, one could conceive of a classification scheme for wetlands based on development potential. Those wetlands close to public and private services and facilities with low costs of development would be classified Class I for development potential. Those in rural areas far from population centers would be in Class V. Comparisons of the results of these two approaches to classification obviously will produce conflicts concerning the preferred use of certain wetlands tracts. The most intense conflicts would arise where "Class I" acres for development are also "Class I" for biological productivity. If few such conflicts exist, then the elaborate apparatus for implementing wetland legislation would be unnecessary since the approximately same wetlands use pattern would result with or without the legislation.

In both cases (development and preservation) the quantification of the actual benefits associated with an additional wetland acre at any point in time is difficult. Although there are estimates of the value of an unaltered marshland acre available, many are products of improper methodologies and there certainly would be a contribution made by more economic-social and biological-physical research in this area.

Conclusion

Frequently resource policy statements revolve around meaningless phrases such as "maximize resource use while minimizing environmental damage." First, it is often not possible to simultaneously achieve these two objectives. Second, objectives such as "minimize environmental damage" miss the point. Minimizing environmental damage or environmental change comes at a cost inconceivably high: no changes, no development, no alterations. A more meaningful goal is the obtaining of optimal mixes of development and preservation. Because information bases are small and because individual evaluations differ, there will always be disagreement as to the appropriate mix. At the same time, to suggest that preservation (or development) choices can be obtained at no cost to society is misleading. Studying the economic implications of any legislation has considerable merit in that such informational bases provide the foundation from which reasoned management decisions can be fashioned.

FOOTNOTES

[1]Va. Code Ann., sec. 21-293 (1975).

[2]Id., sec. 62.1-13.1 (1973).

[3]16 U.S.C. 1452 (1974).

[4]33 F.R. 8280 (1970).

[5]33 U.S.C. 1251 et seq. (Supp. 1976).

[6]Id., sec. 1344.

[7]Id., sec. 1362(7).

[8]Natural Resource Defense Fund, Inc. v. Callaway, 392 F. Supp. 685 (1975).

[9]33 C.F.R. 209 (1976) (40 F.R. 31320 (1975)).

[10]Id., 209.120(d)(2)(i)(b).

[11]Id., 209.120(g)(3)(iv).

[12]Id., 209.120(f)(2).

[13]Id., 209.120(f)(3).

[14]Memorandum of Understanding Between the Secretary of the Interior and the Secretary of the Army, July 13, 1967.

[15]Carter, L. J., "Wetlands: Denial of Marco Permits Fails to Resolve the Dilemma," pp. 641-644, Science, Vol. 192, May 14, 1976.

[16]Va. Code Ann., sec. 62.1-13.1 et seq. (1973), as amended (Supp. 1976).

[17]Id., sec. 62.1-13.3 (1973).

[18]Id., sec. 62.1-13.5 (Supp. 1976).

[19]Id., secs. 62.1-13.5(3), 62.1-13.20 (Supp. 1976).

[20]Id., sec. 62.1-13.5(9)(b)(1973).

[21]Id., secs. 62.1-13.92 to 62.1-13.13 (1973) as amended (Supp. 1976).

[22]Jones, J. C., "Local Environmental Management-A Case Study: The Virginia Wetlands Act, 1972-74," unpublished thesis, School of Marine Science, College of William and Mary, Williamsburg, Virginia, 1976, p. 43.

[23]Md. Ann Code, sec. 9-102 (1974).

[24]Id., sec. 9-202 (1974), as amended (Supp. 1976).

[25]Id., sec. 9-302 (1974).

[26]Id., sec. 9-303 (1974).

[27]Examples of other statutes authorizing governmental land acquisition potentially encompassing wetlands include the Migratory Bird Conservation Act (16 U.S.C. 715 et seq. (1974)), Anadromous Fish Conservation Act (16 U.S.C. 757 (1974), as amended (Supp. 1976)), Endangered Species Conservation Act of 1973 (16 U.S.C. 1531 et seq. (1974)), Federal Aid in Fish Restoration Act of 1950 (16 U.S.C. 777 et seq. (1974)), and the Federal Aid in Wildlife Restoration Act of 1937 (16 U.S.C. 669 et seq. (1974)).

[28]U.S.C. 1221 et seq. (1974).

[29]U.S.C. 1451 et seq. (1974), as amended (Supp. 1976).

[30]U.S.C. 1431 et seq. (1974), as amended (Supp. 1976).

[31]U.S.C. 1461 (1974).

[32]U.S.C. 1455(c)(9)(1974).

[33]U.S.C. 1454(b)(3)(1974).

[34]C.F.R. 920.13(2)(1976).

[35]This statute does not rely on a land acquisition mechanism for sanctuary creation and maintenance but is based on a regulatory approach that restricts activities within the encompassed area.

[36]C.F.R. 922.10 (1976).

[37]Carriker, Roy, "Economic Incentives for Institutional Change: A Case Study of Virginia's Wetlands Legislation," draft of unpublished thesis, Department of Agricultural Economics, VPI&SU, Blacksburg, Virginia, 1976.

[38]The analysis, of course, can be used to measure benefits captured by allowing development to occur. In the Virginia Beach supermarket case, a permit was eventually granted after an appeal. In this case, the losses due to reduced flood protection need to be weighed against benefits gained by allowing the supermarket to fill and develop the marsh.

[39]In this case, according to city appraisals, about $40,000 investment could conceivably be salvaged by selling those lots at a far end of the site that would not damage marsh vegetation.

[40]"Facts about New Super Markets Opened in 1975," Research Division, Super Market Institute, Inc., 1976.

[41]Id.

[42]"The Super Market Industry Speaks, 1976," Research Division, Super Market Institute, Inc., 1976.

[43]These calculations are based on construction sector multipliers calculated for the Eastern Shore economy. The calculation for household income was computed by multiplying direct income payment to households from the construction sector multiplier times the income multiplier times the investment, or .35758 times 1.75 times $465,000 = $292,643.47. The employment multiplier was calculated by multiplying labor-output ratio times employment multiplier times the investment in $1000's. (.05942 times 1.88 times 465 = 52 employees). Also, these calculations as a measure of foregone regional income and employment assume that the unhired 52 employees did not have other employment opportunities within the region. For more information, see Sharma, N. P. and Conner, M. C., "Economic Relationships Among Business Sectors Eastern Shore, Virginia," Research Division Bulletin 88, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

[44]See Sharma and Conner, (Id.) for methodology and multipliers.

[45]This may be because of the grandfather clause which states that any projects started before the Wetlands Act was implemented are exempt from the Act. Many large projects would fall in this category and now show as permit approvals or denials.

[46]Va. Code Ann., sec. 62.1-13.1 (1973).